

Electromagnetic Theory II: Homework 19

Due: 20 April 2021

1 Particle moving in a straight line

A charged particle moves along a straight line, with arbitrary acceleration. Consider the electric and magnetic fields produced at any point along the direction of motion.

- a) Determine expressions for these electric and magnetic fields purely in terms of the charge, speed and retarded separation distance.
- b) Does the particle radiate energy along the direction in which it moves? Explain your answer.

2 Energy radiated away from a constant velocity point charge

A point particle with charge q moves with constant velocity \mathbf{v} . Consider the situation at one instant. Determine the energy that flows out through a sphere center at the charge's location at this instant. *Hint: It will be convenient to set up the situation with the particle moving along the $+z$ -axis.*